

WHAT IS CLAIMED IS:

1. A pre-stressed support system for supporting the excavated ground load by means of supporting members, said supporting members being pre-stressed by means of tensioning members and tendon support members serving to support said tensioning members.
2. The system as defined in claim 1, wherein said supporting members are horizontal beams such as wale for supporting the excavated ground.
3. The system as defined in claim 1, wherein said supporting members are vertical piles for supporting the excavated ground.
4. The system as defined in claim 1, wherein said supporting members are main girder for withstanding load.
5. The system as defined in claim 1, wherein said supporting members are H-piles, steel piles having circular or square sections, or concrete piles having circular or square sections.
6. The system as defined in claim 1, wherein said tensioning members are selected from a group consisting of tendons, carbon fibers, glass fibers, aramid fibers, and etc.
7. The system as defined in claim 1, wherein each of said tendon support members comprises:

a first tendon support disposed at the middle part of each of said supporting members in the longitudinal direction of each of said supporting members; and

second and third tendon supports disposed at both sides of said first tendon support such that the heights of said second and third tendon supports are lower than that of said first tendon support, and wherein said tensioning members are placed on said first, second and third tendon supports.

8. The system as defined in claim 7, wherein said first, second, and third tendon supports and said tensioning members are attached to said supporting members so that said supporting members are pre-stressed at the upper and lower parts thereof in the longitudinal direction, and struts for supporting said supporting members are provided.

9. The system as defined in claim 7, wherein only the lower parts of said supporting members are vertically pre-stressed so that said supporting members are disposed at both sides of the excavated underground space in the lateral direction and the longitudinal direction in large numbers, the pre-stressed main girders are attached to the upper ends of said supporting members disposed at both sides of the excavated underground space so that cover plates are placed on said main girders, a main structure is built in the space between said supporting members disposed at both sides of the excavated underground space at the lower parts of said supporting members, and struts are placed on the main structure such that said struts are fixed to said supporting members disposed at both sides of the excavated underground space.

10. The system as defined in claim 1, wherein said supporting members are wales

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disposed at both sides of the excavated underground space in the longitudinal direction, said tendon support members comprise two of first tendon supports disposed at the middle part of each of said wales in the longitudinal direction and second tendon supports attached to said wales at both sides of said first tendon supports such that the height of said second tendon supports are lower than that of said first tendon supports, said tensioning members are placed on said tendon support members so that said wales are pre-stressed, said struts are disposed at regular intervals in the longitudinal direction of said wales in pairs such that said struts are attached to said wales, the pairs of said struts being braced.

10 11. The system as defined in claim 10, wherein a plurality of vertical piles extended in the vertical direction of the excavated underground space are disposed at said wales at regular intervals, the positions of said tendon support members corresponding to those of said vertical piles directly subjected to the earth pressure.

15 12. The system as defined in claim 7, wherein said supporting members comprise a plurality of first vertical piles arranged at regular intervals in the longitudinal direction and extended in the vertical direction of the excavated underground space, and second vertical piles disposed at both sides of the excavated underground space and extended in the vertical direction of the excavated underground space;

20 said tendon support members and said tensioning members are disposed at the lower parts of said first and second vertical piles so that the lower parts of said first and second vertical piles are pre-stressed;

a plurality of wales are disposed at the upper and lower parts of said first vertical piles so that said first vertical piles are attached to said wales;

said tendon support members and said tensioning members are disposed at said wales so that said wales are pre-stressed;

the upper ends of said second vertical piles disposed at both sides of the excavated underground space are connected to each other by means of main girders;

5 cover plates are placed on said main girders;

said tendon support members and said tensioning members are disposed at said wales so that said wales are pre-stressed;

said second vertical piles disposed at both sides of the excavated underground space are connected to each other by means of a plurality of struts; and

10 the main structure is built in the space between said first and second vertical piles.

13. The system as defined in claim 7, comprising the steps of:

disposing vertical piles at both sides of the excavated underground space in the longitudinal direction after the ground is excavated to a prescribed depth;

15 pre-stressing main girders by means of tendon support members and tensioning members;

disposing the main girders at the upper ends of said vertical piles disposed at both sides of the excavated underground space such that said main girders are connected to said vertical piles;

20 pre-stressing wales by means of tendon support members and tensioning members;

disposing said wales at said vertical piles such that said wales are connected to said vertical piles arranged in the longitudinal direction;

fixing struts to the lower parts of said vertical piles; and

pre-stressing the lower parts of said vertical piles by means of tendon support members and tensioning members.

14. The system as defined in claim 1, wherein said tendon support members are
5 trusses fixed to said supporting members in the longitudinal direction so that said tensioning members are laid on the trusses while said tensioning members are supported by means of said trusses.

15. The system as defined in claim 14, wherein each of the trusses has a long side, a
10 short side, and first and second oblique sides connecting the long and short sides, the long and short sides and the first and second oblique sides together forming a trapezoidal shape, so that one end of said tensioning member is fixed to one surface of the long side of said truss, passes through the first oblique side and the short side of said truss, and is fixed to the other surface of the long side of said truss via the second oblique side of said truss.

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16. The system as defined in claim 14, wherein each of said trusses has a long side, a short side, and first and second oblique sides connecting the long and short sides, the long and short sides and the first and second oblique sides together forming a trapezoidal shape, so that one end of said tensioning member is fixed to one surface of the long side of said
20 truss, is extended to the middle part of the short side of said truss and fixed to the short side, and is fixed to the other surface of the long side of said truss.

17. The system as defined in claim 14, wherein each of said trusses has a long side, a short side, and first and second oblique sides connecting the long and short sides, the long

and short sides and the first and second oblique sides together forming a trapezoidal shape, so that one end of said tensioning member is fixed to one surface of the short side of said truss, is extended in the longitudinal direction of the short side of said truss, and is fixed to the other surface of the short side of said truss.

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18. The system as defined in claim 7, wherein both ends of said respective tensioning members are fixed by means of anchoring units attached to said supporting members.

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19. The system as defined in claim 7, wherein each of said tendon supports has a tendon base formed at the upper end thereof, said tendon base having a curved tendon guide.

20. The system as defined in claim 7, wherein each of said tendon supports has a thread part and a height-adjusting knob so that the height of said tendon support can be adjusted by means of said thread part and said height-adjusting knob.

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21. The system as defined in claim 19, wherein said tendon base is extended in the lateral direction so that said tendon base does not make contact with said support beams, said second and the third tendon supports being fixed to said supporting members by means of "L"-shaped bolts.

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22. The system as defined in claim 19, wherein said tendon base is disposed at both sides of said supporting members so that said tendon base does not make contact with said support beams, said second and the third tendon supports being fixed to said supporting members by means of "L"-shaped bolts.

23. The system as defined in claim 18, wherein said anchoring units are attached to the upper surfaces of said supporting members, and wherein each of said anchoring units comprises gusset plates disposed between flanges of said supporting members, a tendon support plate attached to one side of said flanges, and an anchoring steel plate and a supporting steel plate connected to said tensioning member.

24. The system as defined in claim 18, wherein said anchoring units are attached to the side surfaces of said supporting members, and wherein each of said anchoring units comprises gusset plates disposed between flanges of said supporting members, and a tendon support plate attached to said reinforcing steel plate, said tensioning member being fixed to said tendon support plate.

25. The system as defined in claim 7, wherein said supporting members are supported by means of jack supports mounted to a floor slab, said floor slab being a part of the main structure.

26. The system as defined in claim 7, wherein "[]"-shaped channels are inserted between said flanges of said supporting members for reinforcing said supporting members.

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